

General Biology

INHIBITION OF PATHOGENIC *STREPTOMYCES SCABIES* AS A RESULT OF INTERSPECIES COMMUNICATION BETWEEN *STREPTOMYCES* STRAINS

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Abstract: Potato scab disease is caused by the bacterium *Streptomyces scabies*. The disease affects potato tuber quality and marketability. *Streptomyces* strains that can inhibit the pathogen have been identified and isolated, and can be used as a method of biological control to reduce or eliminate the pathogen population and thus, potato scab disease. Paired *Streptomyces* strain combinations were tested in agar plate bioassays for their ability to interact with each other to inhibit the pathogenic *Streptomyces* strain RB4. Agar plate bioassays demonstrate that *Streptomyces* strains secrete antibiotics into their surroundings that inhibit the growth of the pathogen. Certain strains can induce and enhance antibiotic production in other strains. Bioassays were performed to determine which paired *Streptomyces* strain combinations produced the greatest inhibitory effect on the pathogen. Plugs of agar were removed from next to mature strains that had been streaked onto either oatmeal agar or Nutrient Minimal Media (NMM) agar. These inducer plugs were transferred into holes in a different plate of the same agar. Plates were overlaid with the same agar and incubated for one day at room temperature. Test strains were inoculated (10µL/dot) directly over top of the inducer plugs and incubated for three days at 28°C. Test strains were killed by inverting plates over chloroform and each plate was overlaid with 1.0% water agar. Agar was allowed to solidify and the entire surface of each experimental plate was spread with a spore suspension of strain RB4 (100µL/plate). Plates were incubated for three days at 28°C and zones of inhibition of the pathogen were measured and compared to the appropriate controls. Seven paired *Streptomyces* strain combinations were found to increase pathogen inhibition on both oatmeal and NMM agar. Two of these paired strain combinations produced consistent results on both agar types in second trials of the bioassay. A total of 154 different paired strain combinations were tested on NMM agar, with 15 paired strain combinations (9.74%) consistently and reliably producing increased pathogen inhibition. Forty-one other paired strain combinations were found in which increased pathogen inhibition occurred, but results were not duplicated. A total of 85 different paired strain combinations were tested on oatmeal agar, with 16 paired combinations (18.8%) consistently and reliably producing increased pathogen inhibition. Results indicate that specific *Streptomyces* strains can be induced by other strains to stimulate or enhance their antibiotic production, thus inhibiting growth of the pathogenic *Streptomyces* strain RB4 to a greater extent. Paired strain combinations that effectively inhibit the pathogen will be further tested in greenhouse experiments, in which the paired strain combinations will be inoculated into the soil and tested for their ability to reduce potato scab disease.